Summer 2019

CE 443-141: Foundation Design

Ivan Guzman

CIVIL AND ENVIRONMENTAL ENGINEERING DEPT.
CE 443 FOUNDATION DESIGN
Section: 141
SUMMER 2019
COURSE OUTLINE

Text: Principles of Foundation Engineering 8th ed.; Das, 2016 Cengage Learning
Alternate Text: Foundation Analysis and Design by J. E. Bowles, McGraw Hill

Prerequisites: CE 341, CE 341A.

Catalog: Site investigation, selection of foundation types and basis for design, allowable loads, and permissible settlements of shallow and deep foundations. Computations of earth pressure and design of retaining walls.

Objectives: Students will be provided insights into the following foundation design topics - site investigation, selection of foundation types and basis for design, allowable loads, and permissible settlements of shallow and deep foundations, design of shallow and deep foundations based on site investigation and structural loads, lateral earth pressure and design of retaining walls, and slope stability analysis.

Instructor: Ivan L. Guzman, Ph.D, MBA, PE
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Office Hours: By Appointment

Course Outline:

Day	Topic
1	Review –Shear Strength and Consolidation; Geotechnical Investigations
2 & 3	Bearing Capacity
4	Bearing Stresses and Elastic Settlement
5	Total Settlement
6	Design of Shallow Foundations based on site investigation and given structural loads
7	Midterm Examination
8	Pile Foundations- Types and Installations
9	Pile Capacity
10	Design of Pile Groups
11	Design of Drilled Shafts
12	Lateral Earth Pressure and Retaining Wall Design
13	Slope Stability
14	Review (if time allows)
15	Final Exam

Attendance: Attendance and class participation are mandatory. If you are unable to attend the instructor should be informed prior to the class. If you miss more than five days of classes (five 170 minute sessions) you will receive a failing grade. If absent it is your responsibility to obtain the materials presented and submit homework as assigned on the due date. It is suggested you contact your group to obtain the materials you missed.

Quizzes: Will be given at the beginning of class (5 to 10 minutes) based on material covered in the previous class and from the reading assignments. This quiz can be attempted as a group at the end of the class (5 to 10 minutes). If all members of a group obtain 100% then there will be a 10% bonus. There are no make-up quizzes and a missed quiz will receive a grade of 0. Any student that fails and/or does not take a total of three quizzes will receive a failing grade for the course. All examinations open book, open notes. Bring your own paper to exams.

Homework: Written assignments are to be submitted in class on paper ON OR BEFORE the due date. Electronic submission will not be accepted. Late homework on the due date (after the beginning of class) will incur a 50% deduction, after the due date a 100% deduction will apply. All homework assignments shall be submitted with accompanying figures, tables, drawings, calculations, etc. The following information shall be included:

1. Your name
2. Date
3. Course Title and Number
4. Person to whom it is being submitted.
5. Reference to any drawings, figures, charts etc. – identify and important information that they contain.
6. Description of what information was obtained and used to solve the problem.
7. Important results clearly identified.
8. Appropriate conclusions and recommendations, if required.
9. All sources cited
10. If you assume soil property value you need provide a justification and cite your source.

Include any list of symbols, figures or tables that you think are appropriate but do not obscure the important results with excessive computer output or calculation worksheets. All calculations are to be included, all work presented on engineering graph paper and hand written calculations must be neat. Before attempting homework it is strongly suggested to have a group discussion. However, you need to provide your own homework with your own rationale for the given answer.

Your overall grade will be based on the following:

- 10% Quizzes
- 20% Written Homework Assignments
- 35% Midterm Grade
- 35% Final Grade

The final grade will be as follows:

A	+90%	B+	+85%	B	+80%	C+	+75%
C	+70%	D	+60%	F	<60%		

Course Policy:

- Students will be informed to any modifications from the syllabus during the semester.
- Communication from the instructor will be sent only to your NJIT e-mail address.
- All email to the Professor must include CE 443 – [Email Subject] in the subject line.
- Always bring your text book, a calculator and writing paper to class.
- Only NCEES approved calculators can be used during examinations (no cellphones):

Casio: All fx-115 and fx-991 models, Hewlett Packard: The HP 33s and HP 35s models, Texas Instruments: All TI-30X and TI-36X models

- All material handed out or discussed in class will be part of course material and students will be responsible for studying them in addition to the appropriate sections of the text book.
- Save a copy of your work before submitting it, since it may not be possible to return the corrected homework back in time for you to study for examinations.
- Homework must be done on 8 ½" × 11" engineering calculation paper, in a manner consistent with professional engineering calculation in practice.
- Professional presentation will be part of all grading.
- Please keep a copy of all your work until you have received a final grade.
- No make-up examination will be administered.
- Switch off laptops and cell phones during class, and examinations.
- No recording devices shall be used during class or examinations.

STATEMENT ON ACADEMIC INTEGRITY

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at:

http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. ***Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.*** *If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu*

CE 443 - Foundation Design

Strategies, Actions, Assignments	Assessment Measures	ABET Student Outcomes (1-7)	Program Educational Objectives
Student Learning Outcome 1: Apply subsurface exploration techniques and laboratory tests in design of foundations and retaining walls.			
Develop a site report based on field and laboratory data	Technical report assessment rubric	1, 3, 6	1, 2
Student Learning Outcome 2: Apply the principles of soil mechanics to design of shallow and deep foundations including bearing capacity and settlement calculations			
Students will learn and apply analytical methods incorporating soil mechanics concepts in design of shallow and deep foundations.	Homework, quizzes and examinations.	1, 2	1
Students will learn the relationship between empirical methods, theoretical concepts and design requirements in codes.	Homework, quizzes and examinations.	2, 4	1, 2
Students will visualize, formulate, analyze and design foundations.	Class/group discussions, homework, quizzes, and examinations.	1, 2, 5	1, 2
Student Learning Outcome 3: Compute the lateral earth pressure, select size of retaining walls to ensure safety against external forces and moments as well as excessive settlements.			
Students will learn and use engineering mechanics and soil mechanics concepts in design of retaining walls.	Homework, quizzes and examinations.	1, 2	1
Students will learn the relationship between empirical methods, theoretical concepts and design requirements in codes.	Homework, quizzes and examinations.	2, 4	1, 2

Students visualize, formulate, analyze and retaining walls.	Class/group discussion, homework, quizzes, and examinations.	1, 2, 5	1

CEE Mission, Program Educational Objectives and Student Outcomese mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program educational objectives are reflected in the achievements of our recent alumni:

1 – Engineering Practice: Alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Alumni will advance their skills through professional growth and development activities such as graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Our Student Outcomes are what students are expected to know and be able to do by the time of their graduation:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences

4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Revised: 2/13/18